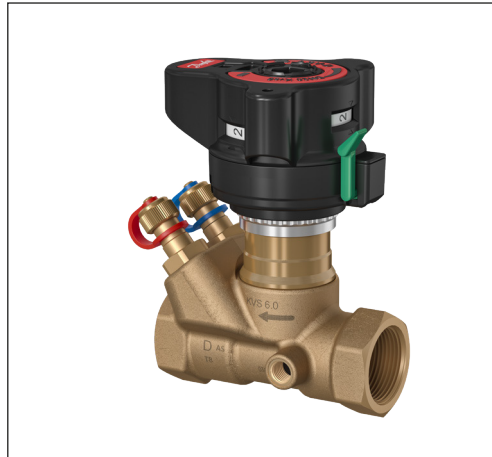




Data sheet

# Partner valve ASV-D (DN 15-50)

Description



ASV-D is a partner valve to be used with the dynamic balancing valves ASV-PV/P or AB-PM to control differential pressure in the risers.

ASV-D is a combined presetting and shut-off valve with a range of unique features:

- high  $k_v$  values for small pressure losses,
- bi-directional valve functionality
- numeric presetting scale visible from multiple angles,
- easy locking of presetting,
- built-in test plugs for 3mm needles,
- removable handle for easy mounting,
- shut off function separated from presetting,
- open-closed color indicator.

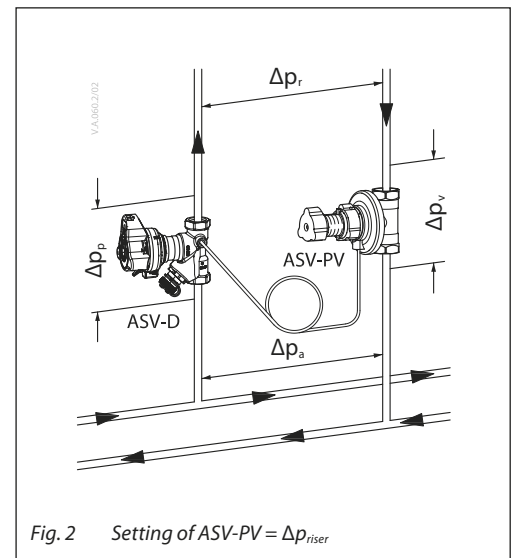
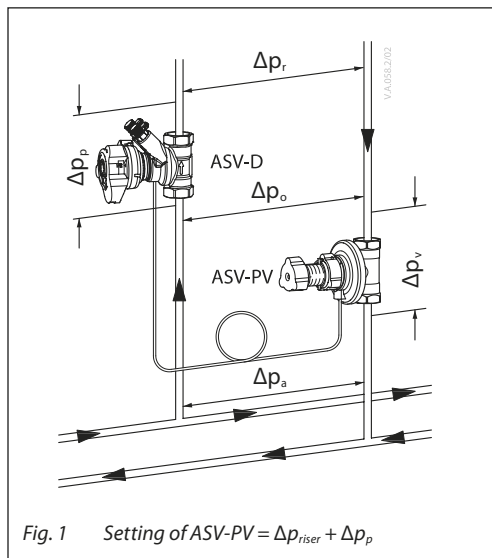
Because of ASV-D's bi-directional functionality the valve can be used inside or outside the control loop.

Applications

ASV-D can be used inside or outside the control loop. Configuration outside the control loop allows flow verification, while configuration inside the control loop allows flow limitation. Valve orientation is crucial to ensure hydronic system is functioning correctly.

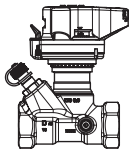
**Partner valve inside the control loop** (Fig.1). Flow is travelling through the valve, in the same direction as indicated by laser engraved arrow on valve body. This orientation offers flow limitation on the riser, however part of the controlled pressure range is used by pressure drop on partner valve ( $\Delta p_p$ ). It is recommended when flow limitation on each terminal unit is not possible.

**Partner valve outside the control loop** (Fig.2). Flow is travelling through the valve, in the opposite direction as is indicated by laser engraved arrow on valve body. This orientation gives best results since the whole controlled pressure range is available to the riser. Flow limitation is done on each terminal unit in the riser (for example RA-N with presetting on radiator, etc). For correct flow measurement it is necessary to swap test plugs color indicators. See more in chapter Bi-directional functionality.



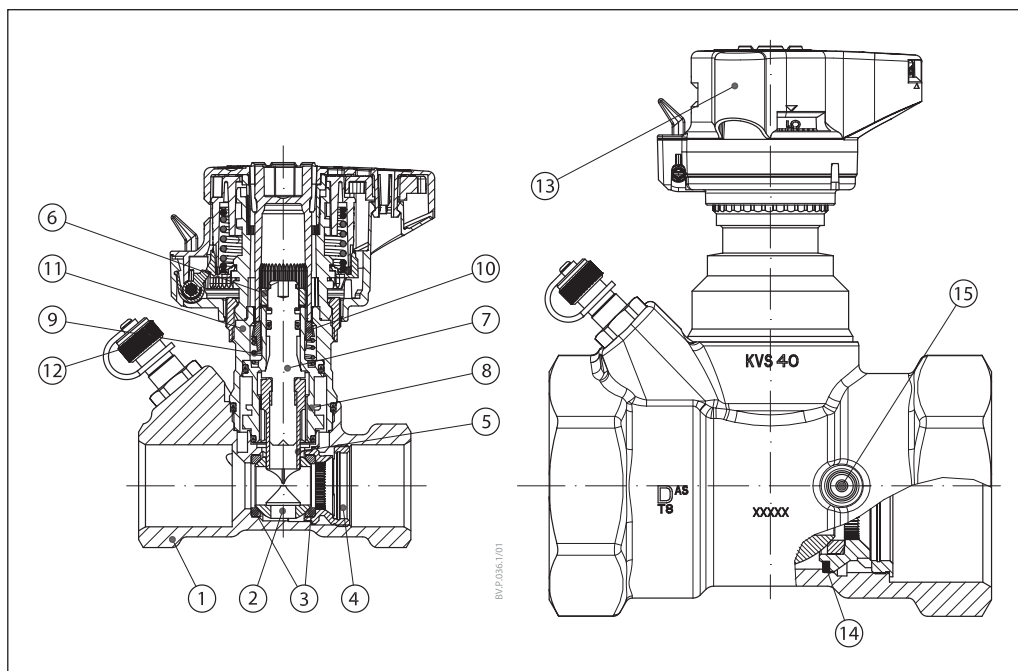
Ordering

**NOTE:** for whole range of ASV partner valves, spare parts and accessories please refer to ASV-PV data sheet.

Type	Material	DN	k <sub>vs</sub> (m <sup>3</sup> /h)	Connections (Internal ISO 228/1)	Code No.
	CW617N	15	3	G 1/2	003Z7008
		20	6.0	G 3/4	003Z7009
		25	9.5	G 1	003Z7010
		32	18	G 1 1/4	003Z7011
		40	26	G 1 1/2	003Z7012
		50	40	G 2	003Z7013

Design

- 1. Valve house
- 2. Ball
- 3. Ball seat
- 4. Support screw
- 5. Throttle
- 6. Spindle head
- 7. Spindle
- 8. Shut off bush
- 9. Spring
- 10. Rotation lock
- 11. Top
- 12. Measuring nipple
- 13. Handle
- 14. Gasket for support screw
- 15. Impulse connection




Accessories and spare parts

Accessories

Type	Code No.
Operating handle	003Z4652
Flow measuring instrument PFM 100 (10 bar)	003L8260
Flow measuring instrument PFM 1000 (10 bar)	003Z8260
Flow measuring instrument PFM 1000 (20 bar)	003Z8261
Identification tag & strips, 10 pcs.	003Z4660

Accessories - Fittings

Type	Comments	to pipe	to valve	Code No.
	Tailpiece threaded (1 pcs.)	R 1/2	DN 15	003Z0232
		R 3/4	DN 20	003Z0233
		R 1	DN 25	003Z0234
		R 1 1/4	DN 32	003Z0235
		R 1 1/2	DN 40	003Z0273
		R 2	DN 50 (2 1/4")	003Z0274

Technical Data

Materials and parts in contact with water

Valve body	Brass - CW617N
O-rings	EPDM
Ball	Brass/chromium plated
Ball sealing	Teflon
Test plugs	DZR brass

Max. static working pressure	20 bar
Static test pressure	30 bar
Max. differential pressure across valve	2.5 bar (250 kPa)
Max. flow temperature	120 °C
Min. temperature	-20 °C
Cooling liquids	Ethylene glycol / propylene glycol and HYCOOL (max. 30 %)

Fitting

Before fitting the valve the installer must ensure that the pipe system is clean. The valve can be turned 360 degrees (if threaded pipe is used).

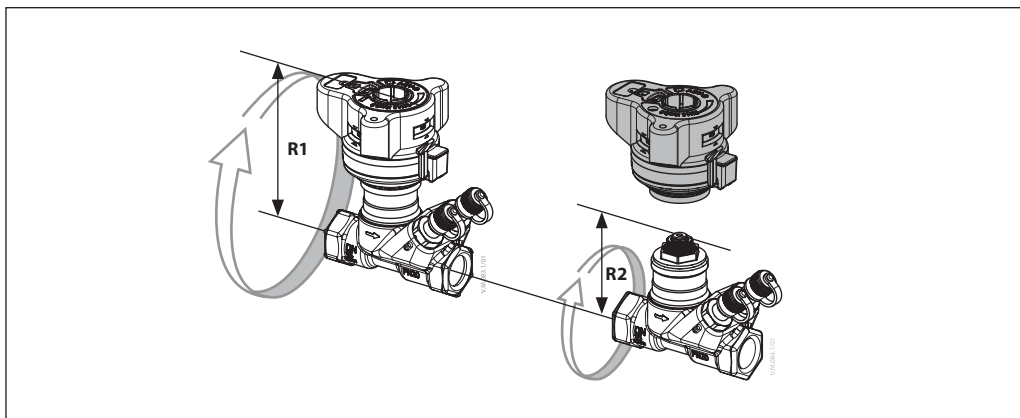
Removal of the handle

1. Set the handle at 0/0.
2. Release the setting lock (green).
3. Unscrew the union nut.

Calibration of the handle

Before refitting, ensure that the handle setting is 0/0.

DN	R1/R2 (mm)
15	92/57
20	95/60
25	98/63
32	121/86
40	125/90
50	129/94



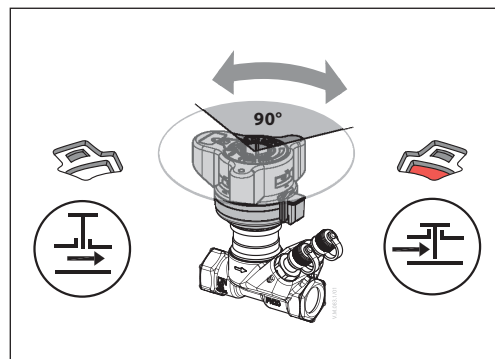
Shut-Off

In order to shut-off the valve the handle must be pressed down.

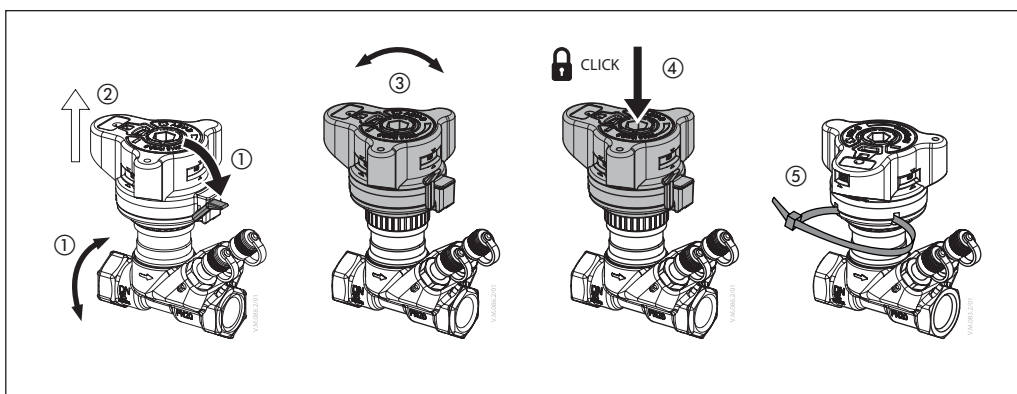
The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:

- red = closed
- white = open



Setting and Locking



The valve has a built-in presetting feature for accurate flow ratings.

Setting the required flow is made in 5 steps:

1. In open position, release the lock using the green lever or a 3 mm Allen key.
2. The handle pops up automatically.

3. The calculated value can now be set.

4. The setting is locked when the handle is pressed to click.

5. Seal - the setting can be protected by using a strip as shown.

Bi-directional functionality

Due to the valve's design it can be installed in the system so that the medium flows through the valve in same direction as is marked on the valve body (Flow arrow), or it can be installed in the system in the opposite direction, to that medium flows through the valve in the opposite direction to the marking on the valve body. The valve  $k_v$  values will remain unchanged, regardless of valve orientation.



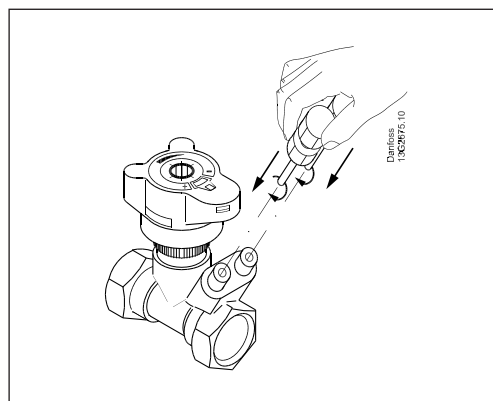
Please, scan QR code or click on link to see animation:  
<https://youtu.be/4zLTNO-jc4Y>

Measuring

The flow through the LENO™ ASV-D valve can be measured using Danfoss PFM 1000 or other brands of measuring instruments. The LENO™ ASV-D valve is supplied with two measuring nipples for 3 mm needles.

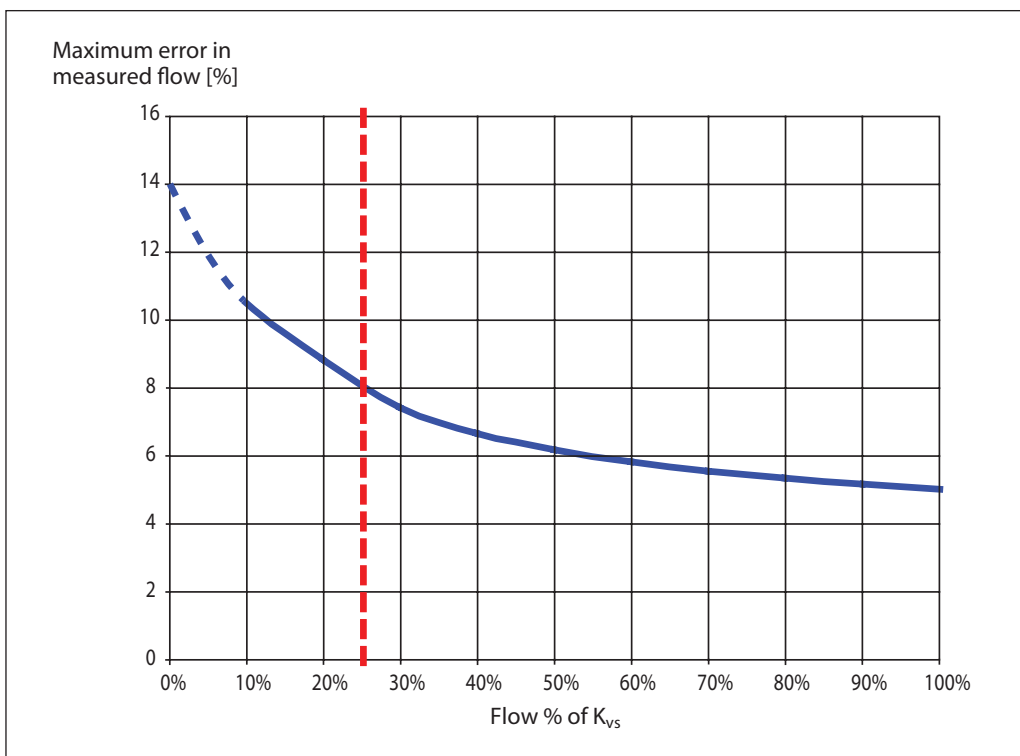
Procedure for flow measuring:

1. Select flow measuring
2. Select valve brand
3. Select valve type and dimension
4. Enter presetting
5. Connect valve and instrument
6. Calibrate static pressure
7. Measure the flow



Danfoss recommends using Danfoss Test needles in order to achieve best measuring results and avoid damages to the test plugs.

Measuring Accuracy



The red line indicates 25% of max. flow.

According to BS7350:1990 flow rates must be within following values:

- ± 18 % at 25 % open position
- ± 10 % at fully open position

LENO™ ASV-D is very accurate, due to the separate functions for presetting and shut-off.

K<sub>v</sub>-Signal

K<sub>v</sub>-signal values are used for non-Danfoss measuring instruments. Danfoss PFM1000 have all data in memory, and the instruments are using this formula:

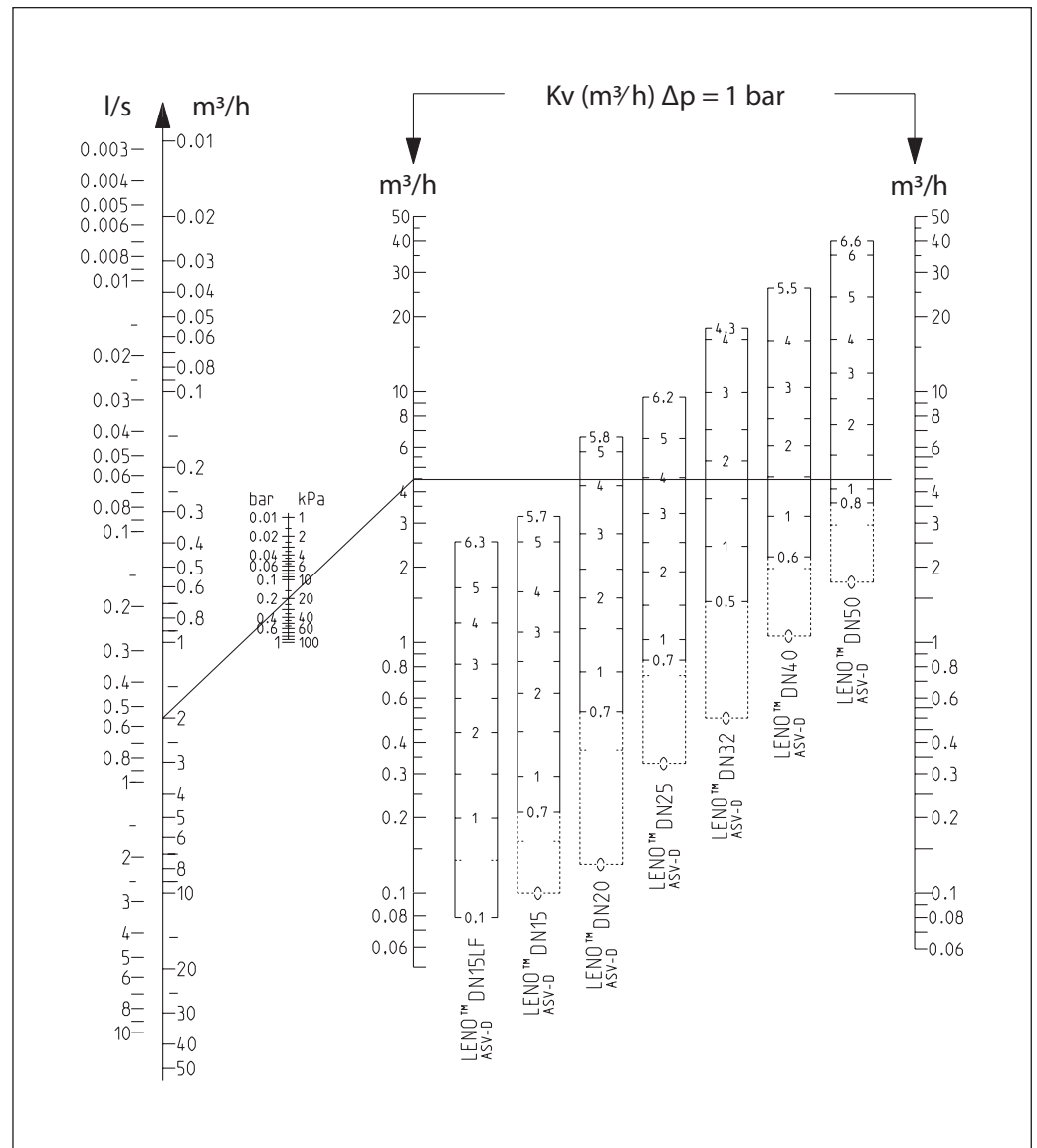
$$P_{val} = P_{sig} \left( 1 + 4 \cdot \frac{k_{v-sig}}{k_{v-val}} \right)^2$$

Δp across the measuring nipples (k<sub>v-sig</sub>) and Δp across the valve (k<sub>v-val</sub>) is not the same due to turbulence influence for pressure measuring.

**K<sub>v</sub>-Signal Values**

Setting	DN 15	DN20	DN25	DN32	DN40	DN50
0.0	0.10	0.12	0.34	0.51	1.05	1.75
0.1	0.11	0.16	0.44	0.73	1.20	2.01
0.2	0.12	0.20	0.53	0.92	1.36	2.25
0.3	0.13	0.26	0.61	1.10	1.55	2.47
0.4	0.14	0.32	0.67	1.26	1.74	2.69
0.5	0.16	0.38	0.73	1.43	1.95	2.91
0.6	0.19	0.45	0.79	1.60	2.17	3.12
0.7	0.21	0.53	0.84	1.78	2.40	3.35
0.8	0.24	0.60	0.90	1.97	2.64	3.58
0.9	0.26	0.67	0.95	2.18	2.88	3.82
1.0	0.29	0.74	1.01	2.39	3.13	4.07
1.1	0.32	0.82	1.08	2.62	3.39	4.33
1.2	0.34	0.89	1.14	2.87	3.64	4.60
1.3	0.37	0.96	1.22	3.12	3.90	4.89
1.4	0.40	1.03	1.29	3.38	4.16	5.18
1.5	0.44	1.09	1.37	3.64	4.43	5.49
1.6	0.47	1.16	1.46	3.92	4.69	5.80
1.7	0.51	1.23	1.55	4.18	4.96	6.13
1.8	0.54	1.30	1.65	4.48	5.24	6.46
1.9	0.58	1.38	1.75	4.76	5.51	6.80
2.0	0.61	1.45	1.85	5.05	5.80	7.14
2.1	0.65	1.53	1.96	5.35	6.08	7.49
2.2	0.69	1.61	2.07	5.65	6.38	7.84
2.3	0.73	1.69	2.18	5.96	6.68	8.19
2.4	0.77	1.78	2.29	6.27	6.99	8.55
2.5	0.80	1.87	2.41	6.60	7.30	8.91
2.6	0.85	1.97	2.53	6.94	7.63	9.27
2.7	0.89	2.07	2.65	7.29	7.98	9.64
2.8	0.93	2.17	2.77	7.67	8.33	10.00
2.9	0.97	2.29	2.89	8.06	8.70	10.37
3.0	1.01	2.40	3.01	8.48	9.08	10.74
3.1	1.04	2.52	3.13	8.92	9.48	11.11
3.2	1.08	2.65	3.25	9.38	9.90	11.49
3.3	1.12	2.78	3.37	9.87	10.33	11.88
3.4	1.16	2.91	3.49	10.38	10.79	12.27
3.5	1.20	3.05	3.62	10.91	11.26	12.67
3.6	1.25	3.19	3.74	11.46	11.74	13.09
3.7	1.30	3.33	3.87	12.02	12.25	13.51
3.8	1.35	3.47	4.00	12.58	12.77	13.95
3.9	1.41	3.61	4.13	13.12	13.30	14.41
4.0	1.47	3.75	4.26	13.64	13.85	14.88
4.1	1.53	3.89	4.39	14.12	14.41	15.38
4.2	1.59	4.02	4.53	14.52	14.98	15.89
4.3	1.66	4.15	4.68	14.84	15.55	16.44
4.4	1.73	4.28	4.82	-	16.13	17.00
4.5	1.81	4.40	4.98	-	16.69	17.59
4.6	1.91	4.52	5.13	-	17.25	18.21
4.7	2.00	4.62	5.29	-	17.80	18.86
4.8	2.08	4.72	5.46	-	18.32	19.54
4.9	2.16	4.82	5.64	-	18.80	20.24
5.0	2.23	4.90	5.81	-	19.25	20.97
5.1	2.30	4.97	6.00	-	19.65	21.73
5.2	2.36	5.04	6.19	-	19.98	22.51
5.3	2.41	5.09	6.38	-	20.24	23.30
5.4	2.46	5.14	6.57	-	20.41	24.12
5.5	2.50	5.18	6.77	-	20.48	24.94
5.6	2.54	5.21	6.96	-	-	25.76
5.7	2.57	5.24	7.15	-	-	26.58
5.8	-	5.27	7.34	-	-	27.38
5.9	-	-	7.52	-	-	28.16
6.0	-	-	7.69	-	-	28.90
6.1	-	-	7.85	-	-	29.59
6.2	-	-	7.98	-	-	30.21
6.3	-	-	8.09	-	-	30.74
6.4	-	-	8.17	-	-	31.17
6.5	-	-	8.22	-	-	31.47
6.6	-	-	-	-	-	31.61

K<sub>v</sub>-Signal



Correction Factors

Temp. °C	Correction factors, ethylene glycol / propylene glycol percentage (max. 30 %)						
	25	30	40	50	60	65	100
-40.0	<sup>1)</sup>	<sup>1)</sup>	<sup>1)</sup>	<sup>1)</sup>	0.89	0.88	<sup>1)</sup>
-17.8	<sup>1)</sup>	<sup>1)</sup>	0.93	0.91	0.90	0.89	0.86
4.4	0.95	0.95	0.93	0.92	0.91	0.90	0.87
26.6	0.96	0.95	0.94	0.93	0.92	0.91	0.88
48.9	0.97	0.96	0.95	0.94	0.93	0.92	0.90
71.1	0.98	0.98	0.96	0.95	0.94	0.94	0.95
93.3	1.00	0.99	0.97	0.96	0.95	0.95	0.92
115.6	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	0.94

<sup>1)</sup> Below freezing point

<sup>2)</sup> Above boiling point

Example: Flow needed = 30 m<sup>3</sup>/h  
 Flow after correction:  
 30 x 0.95 = 28 m<sup>3</sup>/h

Valve Size and Presetting

Example:

Given

Max. pipe flow  $Q = 2 \text{ m}^3/\text{h}$

$\Delta p_r = 15 \text{ kPa}$

$\Delta p_a = 45 \text{ kPa}$

$\Delta p_m = 10 \text{ kPa}$

$\Delta p_i = \Delta p_a - \Delta p_r - \Delta p_m$

$\Delta p_i = 45 - 15 - 10 = 20 \text{ kPa}$

Correct valve size and presetting is found in flow diagramme, page 7.

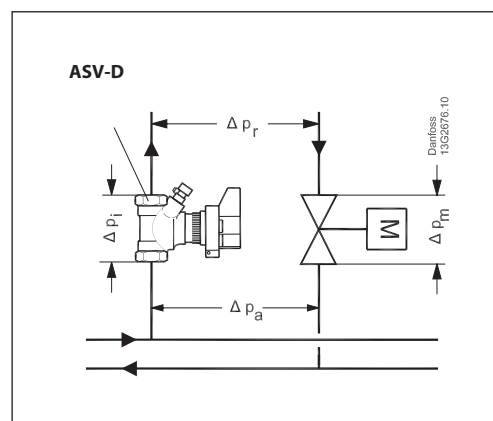
$Q = 2.0 \text{ m}^3/\text{h}$  and  $\Delta p_i = 20 \text{ kPa}$

On page 10 intersect guides and presetting is found to be 4.2 (DN 20 valve).

Setting can be also calculated from the formula:

$$k_v = \frac{Q[\text{m}^3/\text{h}]}{\sqrt{p_i[\text{bar}]}} = \frac{2.0}{\sqrt{0.2}} = 4.5 \text{ m}^3/\text{h}$$

which corresponds to presetting 4.2 as shown on pages 7 and 10.



$\Delta p_r$ , Pressure drop across LENO™ ASV-D valve

$\Delta p_m$ , Pressure drop across valve

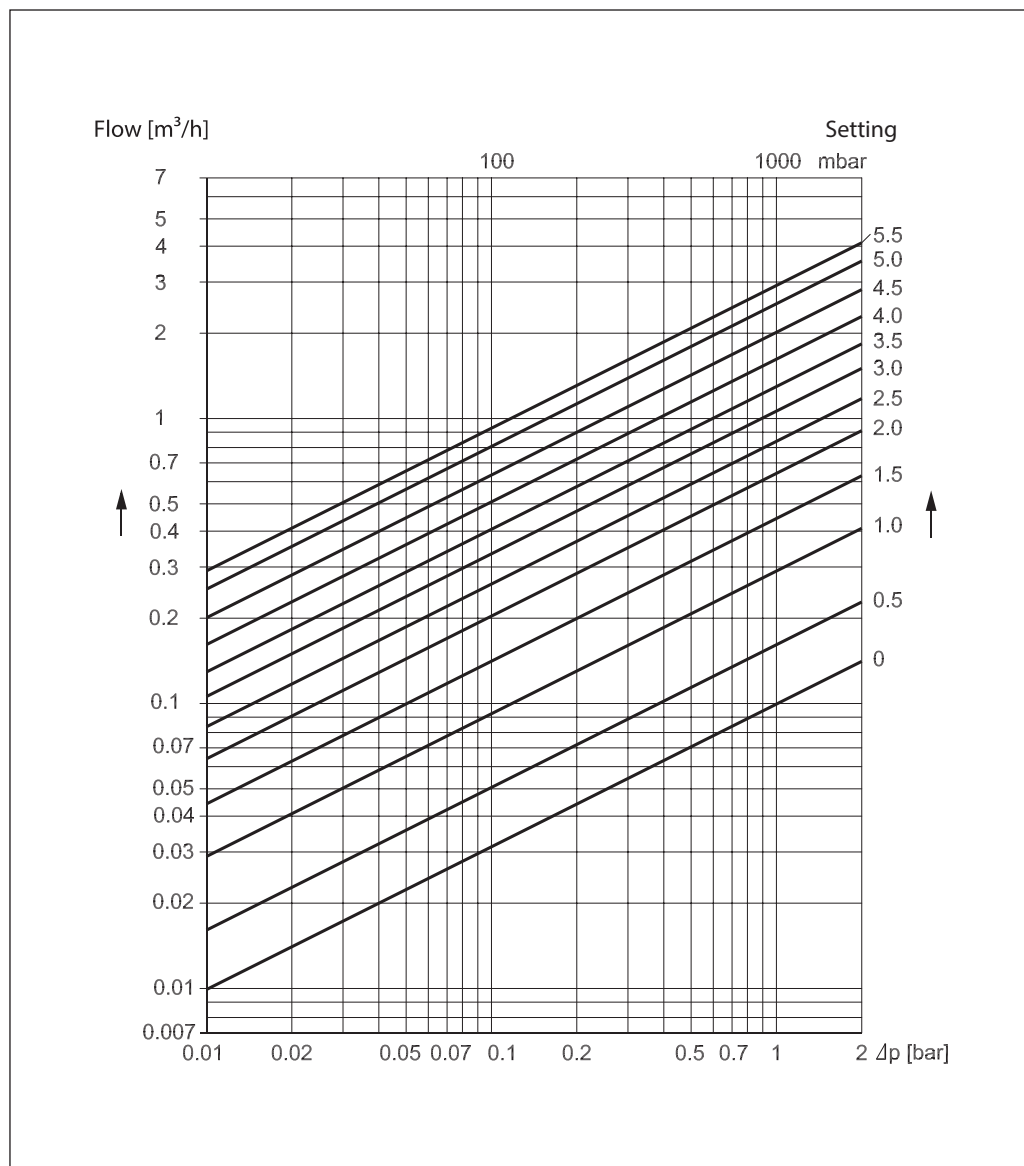
$\Delta p_r$ , Necessary pressure for the riser

$\Delta p_a$ , Available pressure for the riser

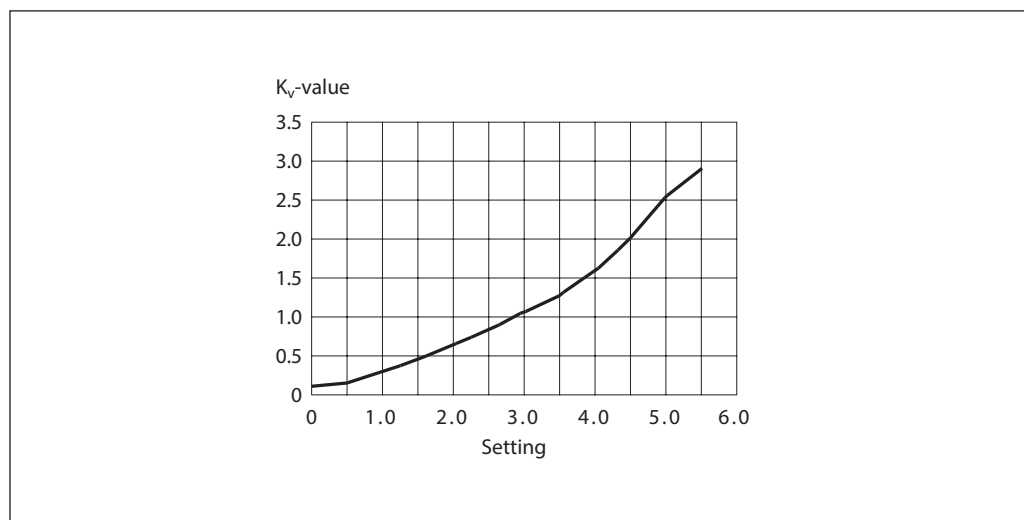
Flow Diagrams,  
DN 15

Setting	$k_v$ -value
0.0	0.11
0.1	0.12
0.2	0.13
0.3	0.14
0.4	0.16
0.5	0.19
0.6	0.20
0.7	0.21
0.8	0.24
0.9	0.27
0.10	0.29
1.1	0.32
1.2	0.35
1.3	0.38
1.4	0.41
1.5	0.44
1.6	0.48
1.7	0.51
1.8	0.55
1.9	0.59
2.0	0.63
2.1	0.67
2.2	0.71
2.3	0.75
2.4	0.80
2.5	0.84
2.6	0.88
2.7	0.93
2.8	0.97
2.9	1.02
3.0	1.06
3.1	1.10
3.2	1.14
3.3	1.19
3.4	1.23
3.5	1.28
3.6	1.34
3.7	1.40
3.8	1.46
3.9	1.52
4.0	1.59
4.1	1.66
4.2	1.74
4.3	1.82
4.4	1.91
4.5	2.00
4.6	2.12
4.7	2.23
4.8	2.33
4.9	2.43
5.0	2.53
5.1	2.61
5.2	2.70
5.3	2.77
5.4	2.84
5.5	2.90
5.6	2.95
5.7	3.00

LENO™ ASV-D DN 15



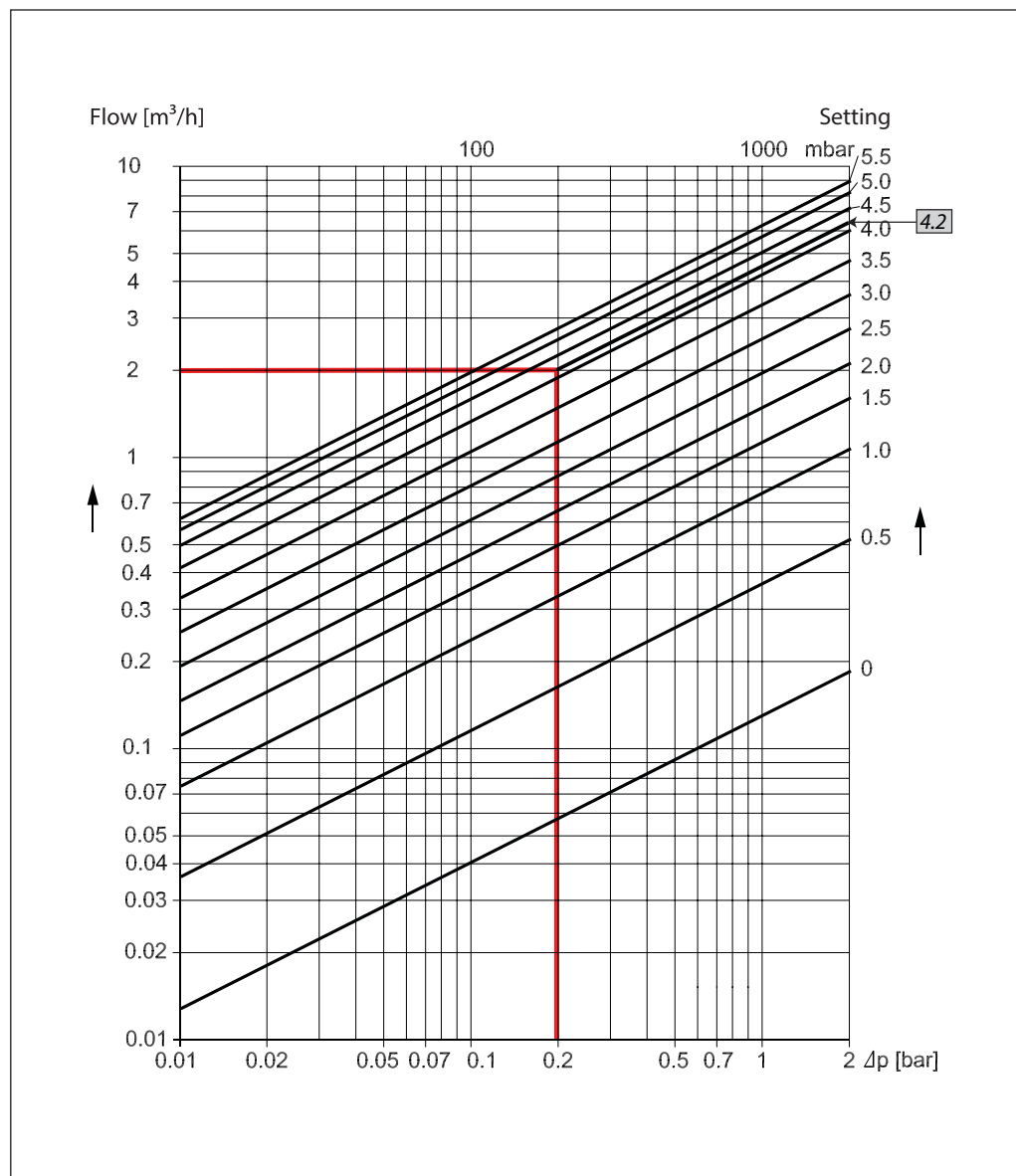
Flow characteristics



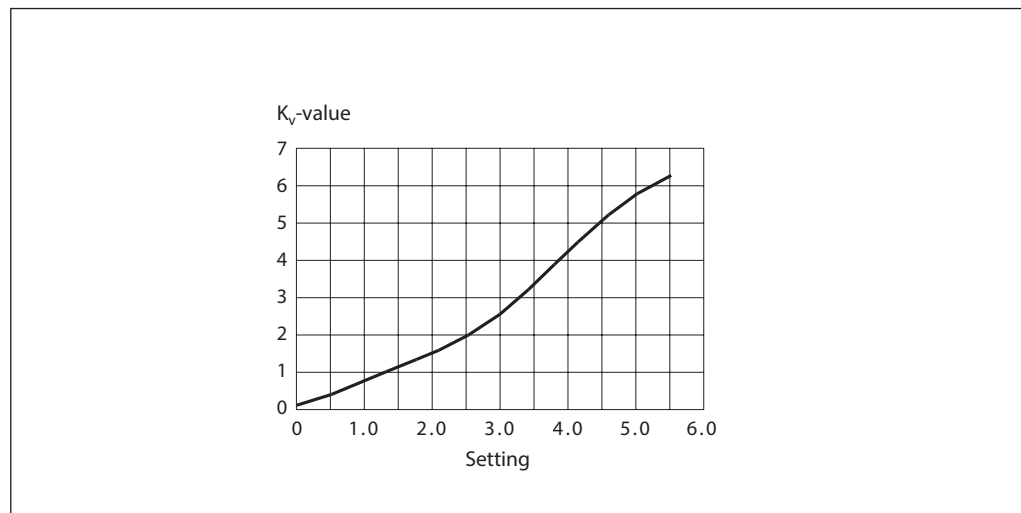
Flow Diagrams,  
DN 20

Setting	$k_v$ -value
0.0	0.13
0.1	0.15
0.2	0.19
0.3	0.24
0.4	0.30
0.5	0.37
0.6	0.45
0.7	0.53
0.8	0.61
0.9	0.68
0.10	0.76
1.1	0.84
1.2	0.92
1.3	0.99
1.4	1.06
1.5	1.13
1.6	1.21
1.7	1.28
1.8	1.35
1.9	1.43
2.0	1.50
2.1	1.59
2.2	1.67
2.3	1.76
2.4	1.86
2.5	1.96
2.6	2.07
2.7	2.19
2.8	2.31
2.9	2.44
3.0	2.58
3.1	2.72
3.2	2.87
3.3	3.03
3.4	3.19
3.5	3.36
3.6	3.53
3.7	3.70
3.8	3.87
3.9	4.05
4.0	4.23
4.1	4.40
4.2	4.58
4.3	4.75
4.4	4.91
4.5	5.07
4.6	5.22
4.7	5.37
4.8	5.51
4.9	5.64
5.0	5.77
5.1	5.88
5.2	5.99
5.3	6.09
5.4	6.19
5.5	6.29
5.6	6.39
5.7	6.49
5.8	6.60

LENO™ ASV-D DN 20



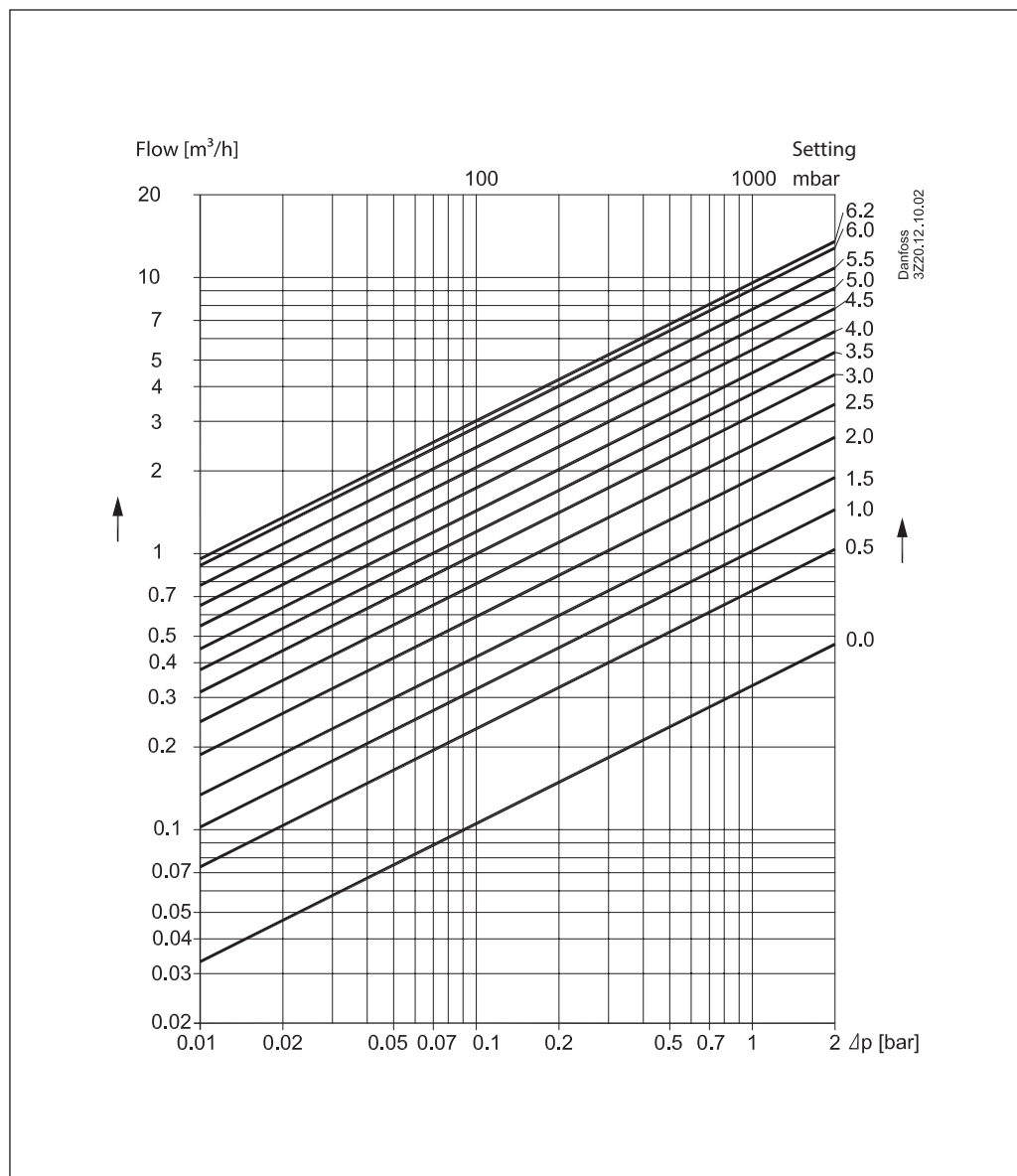
Flow characteristics



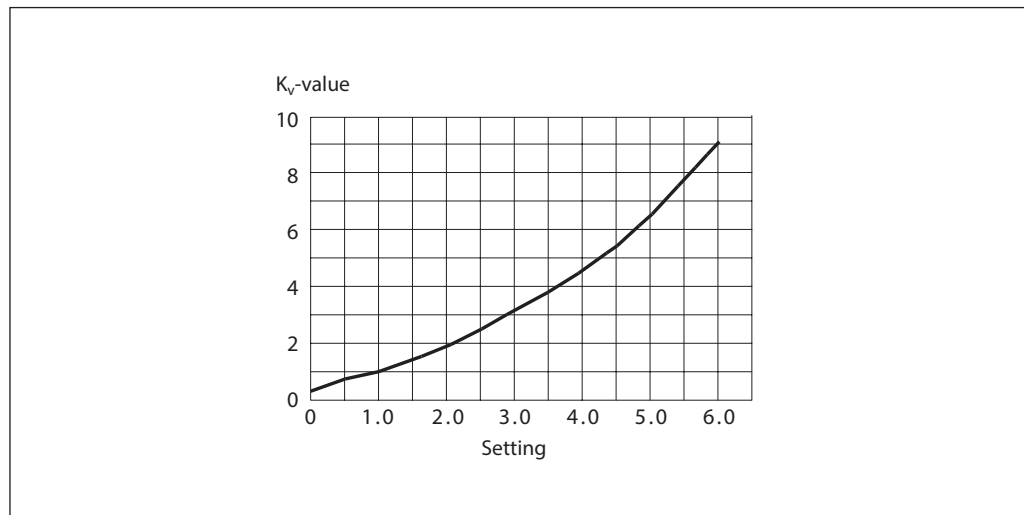
Flow Diagrams,  
DN 25

Setting	$k_v$ -value
0.0	0.33
0.1	0.44
0.2	0.53
0.3	0.61
0.4	0.68
0.5	0.74
0.6	0.79
0.7	0.85
0.8	0.91
0.9	0.96
0.10	1.03
1.1	1.09
1.2	1.16
1.3	1.24
1.4	1.32
1.5	1.41
1.6	1.50
1.7	1.60
1.8	1.70
1.9	1.80
2.0	1.91
2.1	2.03
2.2	2.15
2.3	2.26
2.4	2.39
2.5	2.51
2.6	2.64
2.7	2.76
2.8	2.89
2.9	3.02
3.0	3.15
3.1	3.28
3.2	3.41
3.3	3.54
3.4	3.68
3.5	3.81
3.6	3.95
3.7	4.09
3.8	4.24
3.9	4.39
4.0	4.55
4.1	4.71
4.2	4.88
4.3	5.05
4.4	5.23
4.5	5.42
4.6	5.62
4.7	5.83
4.8	6.05
4.9	6.27
5.0	6.51
5.1	6.75
5.2	7.00
5.3	7.26
5.4	7.53
5.5	7.80
5.6	8.06
5.7	8.33
5.8	8.59
5.9	8.84
6.0	9.08
6.1	9.30
6.2	9.50

LENO™ ASV-D DN 25



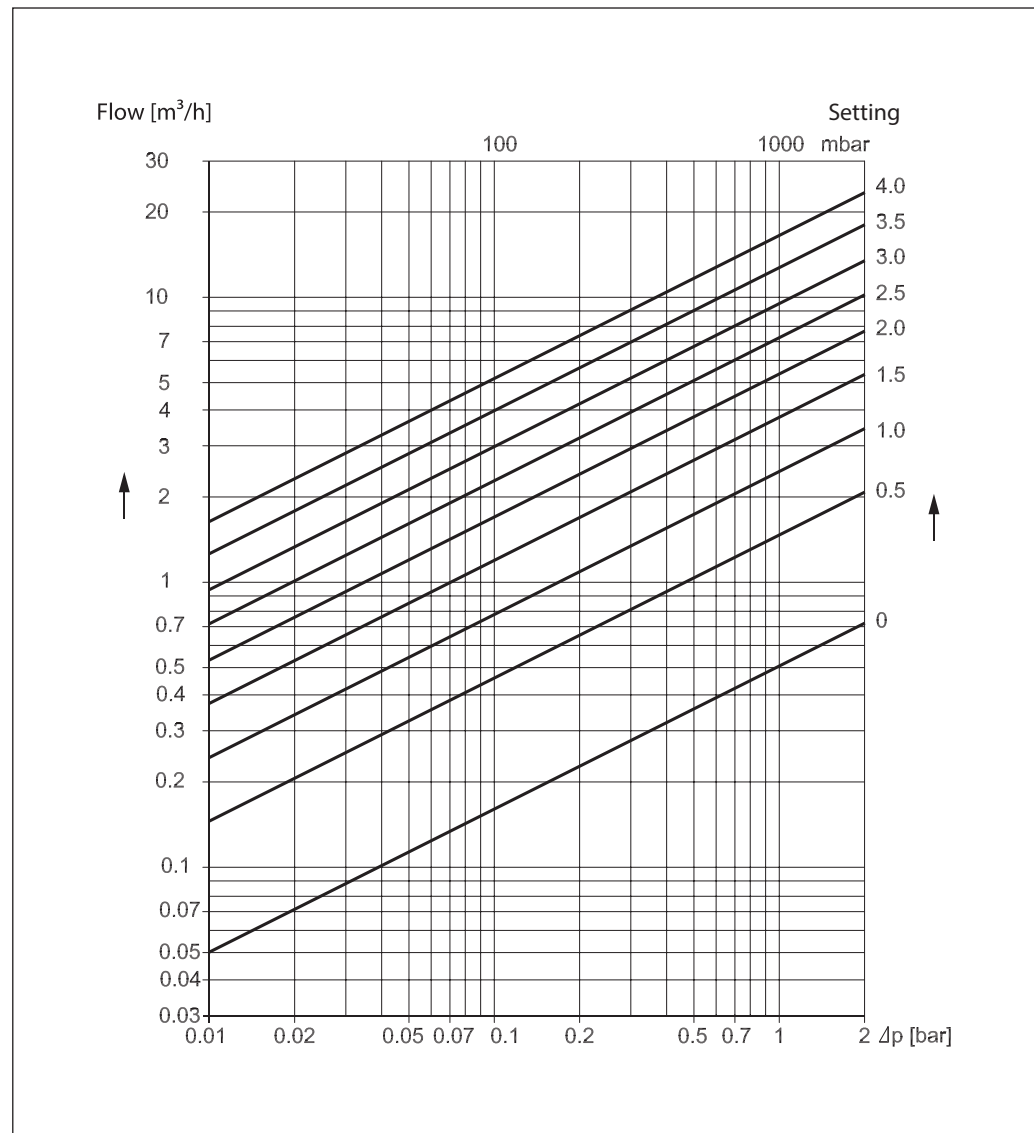
Flow characteristics



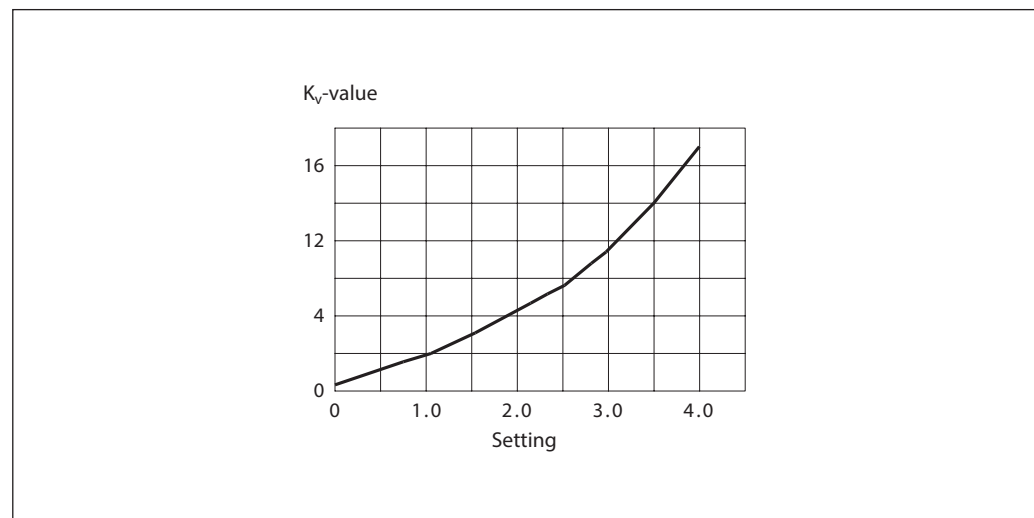
Flow Diagrams,  
DN 32

LENO™ ASV-D DN 32

Setting	$k_v$ -value
0.0	0.50
0.1	0.75
0.2	0.95
0.3	1.13
0.4	1.29
0.5	1.45
0.6	1.62
0.7	1.80
0.8	1.99
0.9	2.20
0.10	2.42
1.1	2.66
1.2	2.92
1.3	3.19
1.4	3.47
1.5	3.75
1.6	4.05
1.7	4.36
1.8	4.67
1.9	4.98
2.0	5.30
2.1	5.63
2.2	5.97
2.3	6.32
2.4	6.68
2.5	7.06
2.6	7.46
2.7	7.89
2.8	8.34
2.9	8.83
3.0	9.35
3.1	9.92
3.2	10.52
3.3	11.16
3.4	11.85
3.5	12.51
3.6	13.23
3.7	13.98
3.8	14.74
3.9	15.49
4.0	16.23
4.1	16.91
4.2	17.51
4.3	18.00



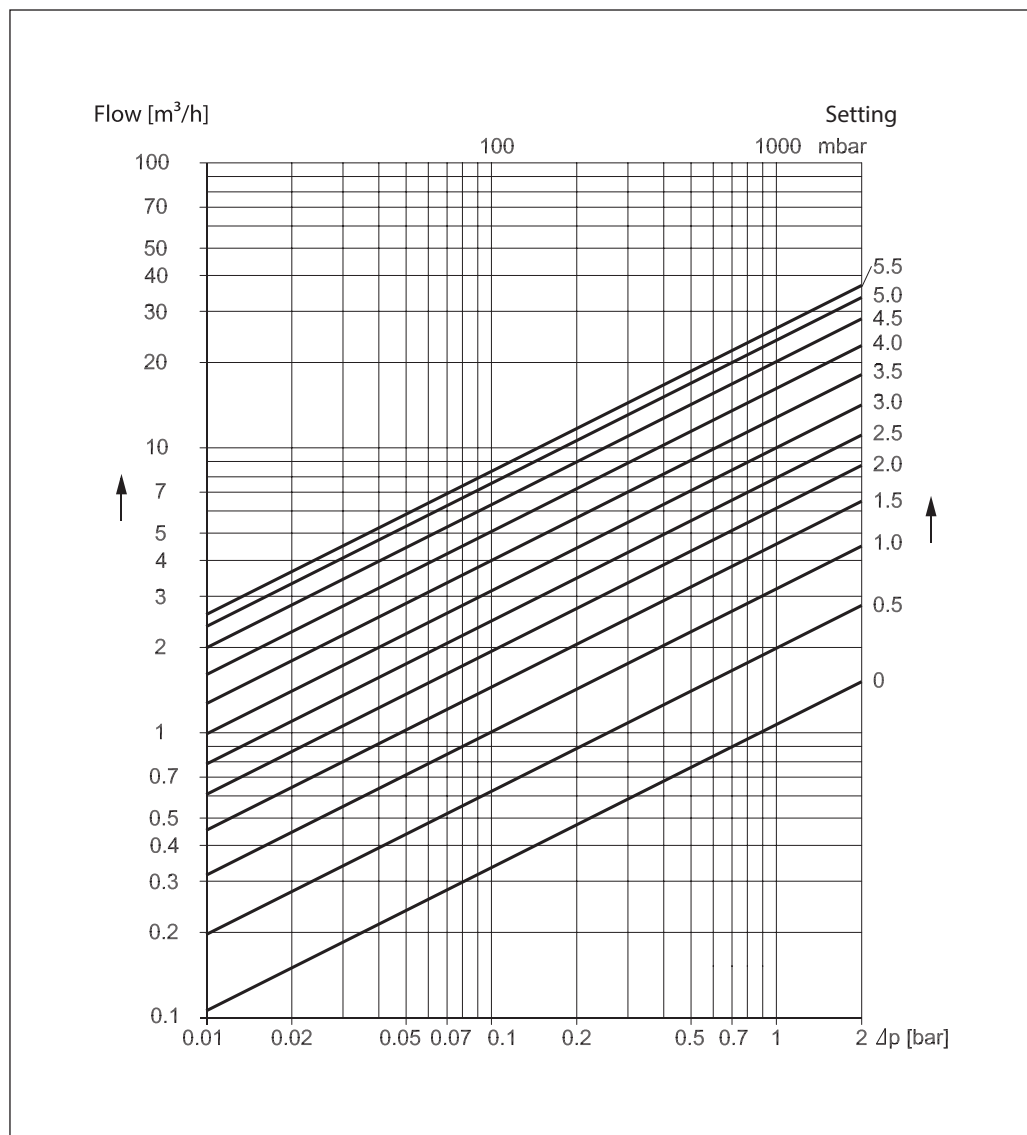
Flow characteristics



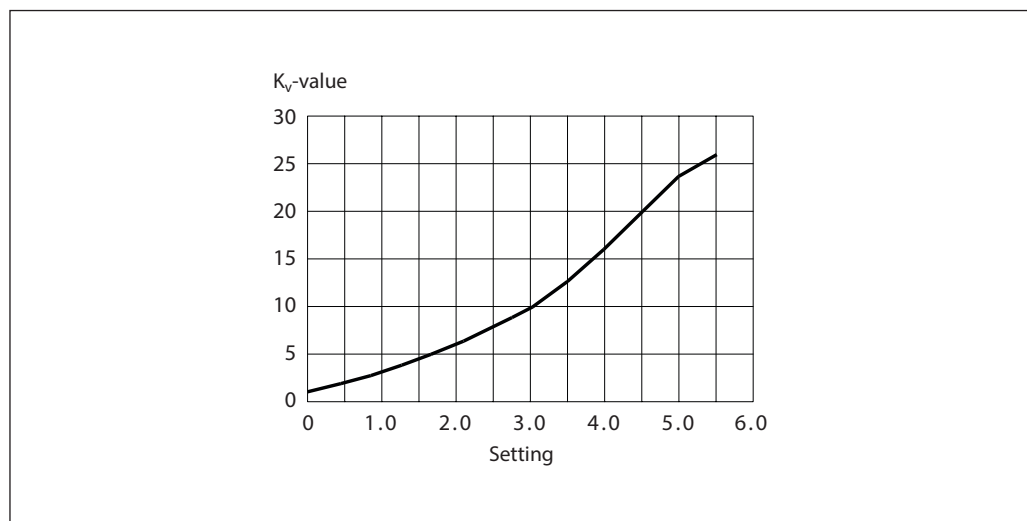
Flow Diagrams,  
DN 40

Setting	$k_v$ -value
0.0	1.06
0.1	1.21
0.2	1.38
0.3	1.56
0.4	1.76
0.5	1.97
0.6	2.20
0.7	2.43
0.8	2.68
0.9	2.93
1.0	3.19
1.1	3.46
1.2	3.73
1.3	4.01
1.4	4.29
1.5	4.58
1.6	4.87
1.7	5.17
1.8	5.47
1.9	5.78
2.0	6.09
2.1	6.41
2.2	6.74
2.3	7.09
2.4	7.44
2.5	7.80
2.6	8.18
2.7	8.58
2.8	9.00
2.9	9.44
3.0	9.90
3.1	10.38
3.2	10.89
3.3	11.43
3.4	12.00
3.5	12.60
3.6	13.22
3.7	13.88
3.8	14.56
3.9	15.28
4.0	16.02
4.1	16.79
4.2	17.57
4.3	18.38
4.4	19.19
4.5	20.02
4.6	20.82
4.7	21.61
4.8	22.38
4.9	23.12
5.0	23.81
5.1	24.44
5.2	25.00
5.3	25.46
5.4	25.80
5.5	26.00

LENO™ ASV-D DN 40



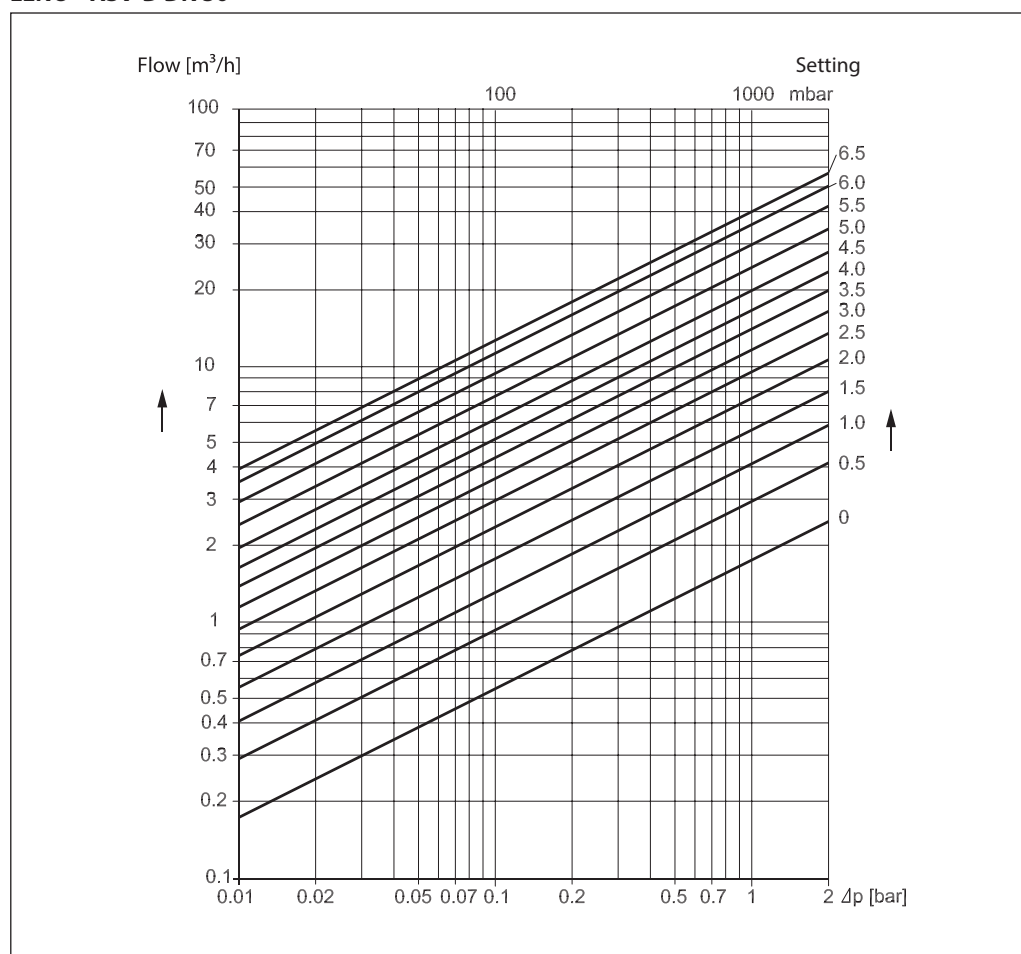
Flow characteristics



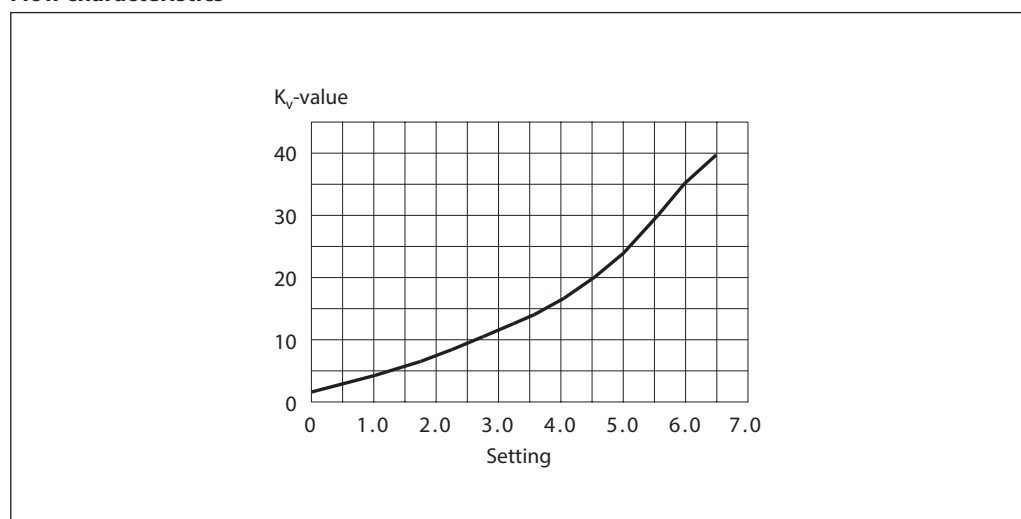
Flow Diagrams,  
DN 50

Setting	$k_v$ -value
0.0	1.74
0.1	2.03
0.2	2.28
0.3	2.51
0.4	2.73
0.5	2.95
0.6	3.16
0.7	3.38
0.8	3.61
0.9	3.85
1.0	4.10
1.1	4.37
1.2	4.65
1.3	4.95
1.4	5.26
1.5	5.59
1.6	5.93
1.7	6.28
1.8	6.64
1.9	7.01
2.0	7.39
2.1	7.78
2.2	8.17
2.3	8.56
2.4	8.96
2.5	9.36
2.6	9.76
2.7	10.17
2.8	10.58
2.9	10.99
3.0	11.41
3.1	11.84
3.2	12.27
3.3	12.71
3.4	13.16
3.5	13.62
3.6	14.10
3.7	14.60
3.8	15.12
3.9	15.66
4.0	16.23
4.1	16.84
4.2	17.47
4.3	18.14
4.4	18.84
4.5	19.59
4.6	20.38
4.7	21.21
4.8	22.08
4.9	23.00
5.0	23.96
5.1	24.96
5.2	26.00
5.3	27.07
5.4	28.17
5.5	29.30
5.6	30.44
5.7	31.64
5.8	32.83
5.9	34.01
6.0	35.14
6.1	36.23
6.2	37.24
6.3	38.14
6.4	38.93
6.5	39.56
6.6	40.00

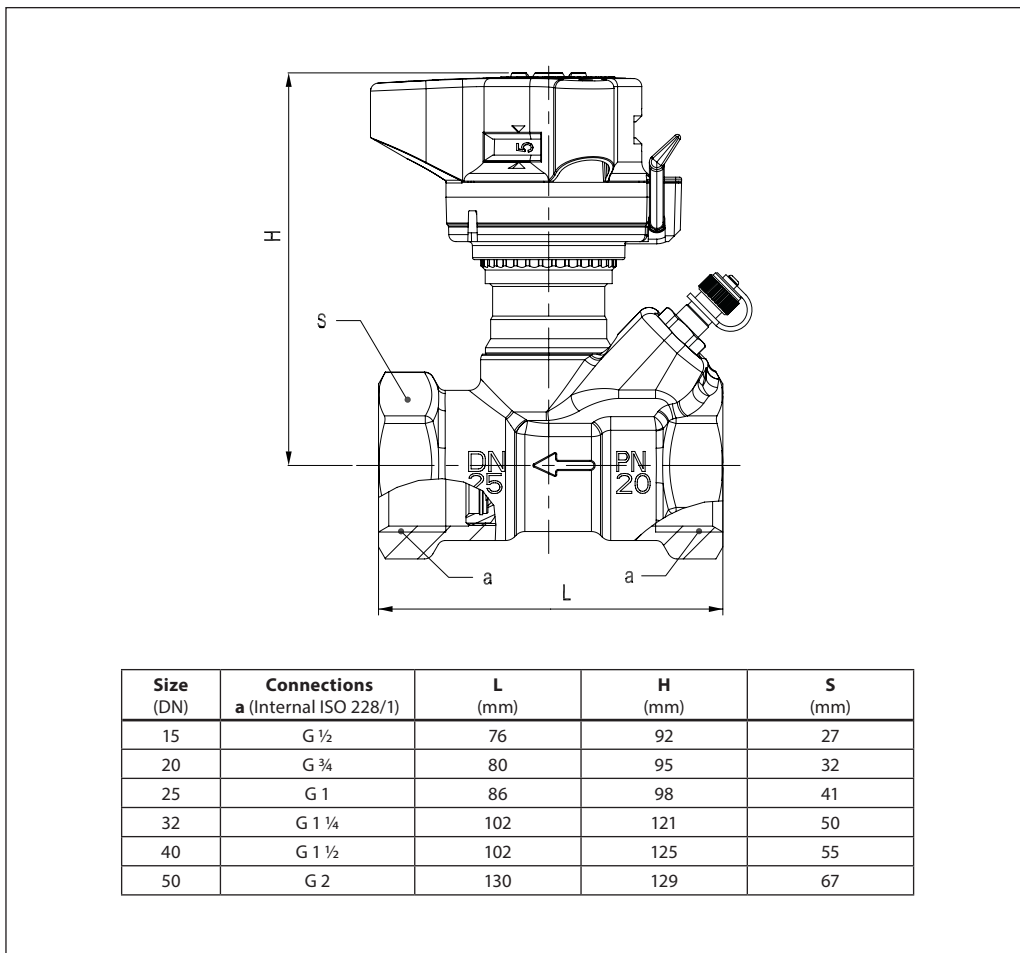
LENO™ ASV-D DN 50



Flow characteristics



Dimensions





Tender specifications

Features	LENO™ ASV-D
Balancing/Commissioning	•
Presetting	•
Fixed orifice	•
Self sealing test plugs	•
Digital visible scale from more sides	•
Shut off function (ball valve)	•
Draining/filling	•
Draining/filling on both sides of the valve	•
Removable handle	•
Closing indicator	•
Allen key for ball valve	•
Parallel test plugs	•
360° rotating measuring station (drain cock and measuring nipples)	•

Presetting values are visible on top of the valve and from all sides.  
 Presetting is locked by pressing down the handle. When locked, the shut off function can be used without changing the presetting.  
 The handle is released with the green key or with a 3 mm Allen key.  
 To prevent unintended changes of the presetting, the handle can be sealed by using a strip.

The valve features impulse tube connection.  
 The valve is bi-directional, and can be installed inside or outside the control loop.  
 In factory orientation the valve is installed inside control loop.

LENO™ ASV-D has a leakage rate A according to BS 7350 : 1990, the ball valve is 100% tight.

There are no requirements for inlet and outlet conditions.

The LENO™ ASV-D measuring accuracy is 10% up to 25% of max. setting.  
 Accuracy is according to BS 7350 : 1990.

Measuring instruments must be equipped with 3mm measuring needles. Danfoss recommends using Danfoss PFM100 or Danfoss PFM1000.

Valve sizes ..... DN 15 – DN 50  
 Pressure class ..... PN20  
 Static test pressure ..... 30 bar  
 Working temperature ..... -20 °C to 120 °C  
 Working area ..... 10-100 % of the  $k_{vs}$ -value

The valve body is made of CW617N brass.  
 The ball is made of chromium plated brass.  
 O-rings are made of EPDM rubber.

Danfoss A/S

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